Kent & Medway Cancer Collaborative

Imaging for Cancer

Pathway of Care

Publication date	January 2015
Expected review date	January 2017
Version number	9.0
Version status	Final

Table of Contents

1.0 Introduction and background

This guidance has been produced by Kent & Medway - Cancer Tumour Site Specific Groups (TSSGs).

NICE have produced a serious of “Improving Outcomes Guidance” (IOG) documents which are cancer disease site specific. They provide a framework for the consistent approach to the diagnosis, treatment and support of patients with suspected or confirmed cancer.

Compliance with IOG is tested through the process of External Peer Review. This is an audit process using standards (quality measures) defined in the Manual of Quality Measures (QMs). There are now specific QMs for radiology against which radiology departments will be externally audited at peer review.

In the newly revised Manual of QMs (May 2004), at a disease site specific level, there is a requirement for network based TSSGs to define:

- Imaging for diagnosis
- Imaging for staging
- Imaging for surveillance

The TSSGs had already anticipated the QMs and had defined imaging guidance.

The QMs for gynaecological and urological cancers do not ask for imaging guidance for these cancers. Because imaging is an important factor in the pathways for both these cancers it is described here in full.

Both locally and nationally The Cancer Services Collaborative Improvement Project had identified that access to diagnostics (including radiology, pathology and endoscopy) represents the biggest bottleneck along the patient journey. Ironically, IOG recommendations have directly contributed to the problem. In the drive to achieve a networked/specialist approach to care, patients now frequently travel to hospitals around Kent & Medway (& other areas, most commonly in London) for different aspects of their overall care package. In common with other patients from other networks across the UK, patients are frequently investigated several times for the same thing in the different hospitals they attend on this journey. This causes unnecessary duplication of investigations contributing to the shortage of capacity. This common practice may also be at odds with recommendations set out in the IRMA regulations.

The K&M – Cancer Imaging Guidance seeks to:

- Help TSSGs, Trusts, disease site multidisciplinary teams and Kent & Medway – Cancer to comply with IOG and QMs
- Provide a framework for the consistent approach to diagnosis, staging and surveillance – end post code variations in practice
- Assist radiology departments in controlling demand and manage capacity

2.0 Breast Cancers

2.1 Diagnosis

1) Mammogram - Not usually done under age 40 (***Note**: In cases of breast cancer a mammogram of the affected breast should always be obtained even if there is a fairly recent mammogram, this aids subsequent audit, especially NHSBSP)*
2) Breast Ultrasound
3) Core biopsy +/- FNA
4) Axillary US and FNA/Biopsy is done to assess for spread to the axilla not for residual disease
5) MRI (***Note:** Only following MDM discussion; RCR recommends for assessment of Multifocality, & lobular cancer or residual tumour post-surgery)*

2.2 Staging

1) CXR
2) CT Chest, abdomen and pelvis
3) Isotope bone scan
4) (Sentinel node biopsy with pre surgery isotope scan) routinely no imaging is done separately (i.e., pre-surgery scan) as they go straight to the theatre after injection and is assessed there prior to surgery.

2.2.1 Re-staging

1) CT Chest and liver, or CT chest, abdomen and pelvis, according to the clinical situation
2) Isotope bone scan
3) PET-CT - Identifies small volume recurrence and lytic bone metastases
4) MRI - For symptomatic brachial plexopathy (***Note:** Following local recurrence or contralateral cancer the surveillance mammogram clock starts clicking)*

2.3 Surveillance post-surgery

Following WLE or mastectomy for DCIS, IDC or ILC:
1) Baseline mammogram at one year then annual mammogram for total 5 years
2) Thereafter:
    - Patients aged >47 enter NHSBSP, but as first invitation may not be until age 52 years 364 days, should continue annual mammography to age 50 or first invitation if this is earlier
    - Patients aged <47 continue annual mammography until age 50 or first invitation within the NHS BSP if this is earlier
    - Patients in a trial – follow the proforma

2.3.1 Surveillance for FH risk

(***Note***: Funding - To be sought to ensure compliance with NICE guidelines)

1) Near population risk:
- 10 year risk, <3% for women aged 40-49 and lifetime risk from age 20 <17%
- Managed in primary care with advice and support
2) Moderate risk:
- 10 year risk 3-8% for women aged 40-49 and lifetime risk between 17-30%
- Managed in secondary care with annual mammography from 40-47, then surveillance until age 50 or first invitation within the NHSBSP if this is earlier
3) High risk:
- 10 year risk >8% for women 40-49 or life time risk ≥30% or greater, also ≥ 20% chance of mutation of BRCA1, BRCA2 and TP53, or rare condition with increased risk of breast cancer such as Peutz-Jegher syndrome (STK11), Cowden (PTEN) and familial diffuse gastric cancer (E-Cadherin)

- Annual mammography and/or MRI from 40-47, some groups may be eligible for MRI / mammography aged 30
- Over 47 all groups revert to the NHSBSP, with annual surveillance to age 50 or first invitation within the NHS BSP if this is earlier, though gene positive women may merit more frequent mammography

2.3.2 Hodgkin's surveillance

***(Note:** G Ralleigh Breast Cancer Online 2005 8(10))*

1) After supradiaphragmatic irradiation under age 35
2) Treated <17years: screen from age 25 years (15X25 risk)
3) Treated 17-35 years: screen from age 8 years after completion of Rx
4) Current age:
    - <25 Years - No imaging
    - 25-29 Years - Annual MRI – but if contra-indicated then annual ultrasound
    - 20-50 Years - Baseline mammogram:
        - If predominantly fatty Then annual mammogram to age 50
        - If predominantly dense Then annual mammogram and MRI
        - (If MRI contra-indicated Then annual mammogram and ultrasound)

2.4 Patients with ADH/atypical hyperplasia diagnosed on surgical biopsy/mammotome

1) Over 47 - Return to NHSBSP but as first invitation may not be until age 52 years 364 days, should continue annual mammography to age 50 or first invitation if this is earlier

2) Under 47 - Annual surveillance until 47 then NHSBSP but as first invitation may not be until age 52 years 364 days, should continue annual mammography to age 50 or first invitation if this is earlier

2.5 Techniques

2.5.1 Mammography

Routine 2 view mammography +/- special views

2.5.2 Breast ultrasound

High frequency ultrasound > 10MHz with harmonics

2.5.3 CT Chest/abdomen

1) Spiral, post contrast
2) Include chest, liver and SCF
3) Image on bone, ST and lung windows

2.5.4 Breast MR

1) Dedicated coil
2) T2 axial or coronal
3) Dynamic post contrast coronal with subtraction and fat saturation
4) For screening and surveillance, when relevant, scanning should be performed between days 6 and 16 days of the cycle

2.6 PET-CT for breast cancer

Assessment & localisation of brachial plexus lesions – radiation effects Vs malignant infiltration. – *(ARSAC discretion)*

NOTE: *PET-CT for breast cancer falls within the "discretionary circumstances" section of the PET-CT guidelines and the decision whether or not to perform PET-CT will be at the discretion of the ARSAC Licence Holder of the department to which requests are submitted.*

3.0 Colorectal Cancer

3.1 Colon Cancer

3.1.1 Screening

The NHS Bowel Cancer Screening Programme offers screening every two years to all men and women aged 60 to 75. This takes the form of faecal occult blood testing (FOBT) with colonoscopy and, in some cases, CT colonography offered to FOBT-positive tests. CT colonography is indicated for the detection of medium or large polyps, or symptomatic cancers for patients who are unable to undergo colonoscopy, or in whom the procedure has failed.

CT colonograpy (CTC) is of comparable sensitivity to colonoscopy for the detection of polyps and tumours. CTC is indicated in the National Bowel Cancer screening programme for patients with contraindications to undergo colonoscopy and for failed or incomplete colonoscopy. Colonoscopy is the investigation of choice in younger patients and allows tissue diagnosis.

Barium enema should not be performed as a first line alternative to colonoscopy. If the patient is unfit for CTC then they are deemed to have failed bowel cancer screening.

3.1.2 Staging

All patients with colon cancer diagnosed at endoscopy or suspected following virtual CT colonography should undergo staging.

3.1.3 Staging Objectives

To identify potential surgically difficult cases; for example, tumours that infiltrate into adjacent structures and those presenting with bowel perforation.

To determine the size and local extent of tumour and to document the extent in millimetres of extramural pericolic tumour infiltration.

To document extension of tumour into adjacent structures such as abdominal wall, peritoneum, solid organs.

To identify complications, such as the presence of bowel obstruction or perforation.

To note the presence and extent of local pericolic nodal involvement, extramural vascular invasion, the presence or absence of spread beyond the peritonealised colon surface and to document the presence or absence of distant metastases.

Nodes in the retroperitoneum, pelvis and inguinal regions are considered to be metastatic.

To state the size and segmental distribution of suspected metastatic disease in distant organs including the lungs and liver and to recommend referral to HPB MDT for review if potentially resectable metastatic disease is shown.

3.1.4 Technique

CT of the thorax, abdomen and pelvis is the primary imaging investigation. Abdominal ultrasound alone is not regarded as sufficient.

3.1.5 CT technique :

Oral administration of 1 litre of water or iodinated contrast medium to delineate small and large bowel.

100–150 ml of intravenous iodinated contrast medium injected at 3–4 ml/sec. MDCT is commenced at 20–25 seconds (chest) and 70–80 seconds (abdomen and pelvis) post-injection.

3.2 Rectal Cancer

3.2.1 Staging

All patients with rectal adenocarcinoma should be staged. Depending on the preoperative treatment policy of the colorectal multidisciplinary team (MDT), upper rectal and sigmoid tumours may be staged using MRI.

3.2.1 Staging Objectives

To document disease that is not potentially resectable with clear radial margins by total mesorectal excision plane surgery: namely tumour <1 mm or beyond the mesorectal fascia or tumour extending into or beyond the intersphincteric plane.

To document the length of tumour and location with respect to height above the anal verge and puborectalis sling to enable preoperative surgical management decisions regarding plane of surgery and potential sphincter preservation.

To describe the area/quadrant of maximal infiltration by tumour to enable surgical and radiotherapy planning.

To document the depth of extramural tumour spread within the rectal wall – for tumours that have spread beyond the muscularis propria, to measure the extramural tumour spread in mm (for prognostic T substage) into the mesorectum and the presence of adverse features such as nodal spread, extramural venous invasion and peritoneal infiltration.

To identify the presence of complications such as obstruction or perforation.

To identify loco-regional nodes outside the mesorectum: external and common iliac regions and internal iliac nodes.

To use CT to assess lungs, liver, peritoneal cavity and retroperitoneum for presence of metastatic disease

To document segmental distribution of spread to lungs and liver to enable assessment as to whether disease is resectable.

3.3 Staging

3.3.1 MRI

MRI is the investigation of choice for preoperative local staging of rectal cancer. It will show the relationship of tumour to the muscularis propria extension through the rectal wall and to the mesorectal fascia and also involvement of local nodes and vessels and thus fulfil all the local staging objectives.

Protocol for MRI imaging of rectal cancer

Sequence	Plane	Slice thickness	Field of view	Principle observations
T2W	Sagittal	5mm	Large	Localise tumour, height of tumour above anal verge, length of tumour
T2W	Axial	5mm	Large	Pelvic disease outside mesorectum
T2W	Oblique axial/coronals for low rectal tumours	3mm	Small 16cm FOV 256x256 matrix 0.6 x 0.6mm in plane resolution	Assess primary tumour and spread within mesorectum to the L5/S1 level Scans perpendicular to the long axis of the rectal wall and coronal imaging to assess the intersphicteric and levator planes
T2W	Coronal oblique angled to sacrum	3mm	Small as above	Nodes along drainage path of superior rectal vessels

Anti- peristaltics may be helpful in a minority of cases (such as female patients post-hysterectomy).

When reporting MRI scans, the following key findings should be stated:

Height from puborectalis sling and anal verge and craniocaudal length

Assessment of the safety of the total mesorectal excision surgical (TME) plane

Relationship to important landmarks, such as peritoneal reflection/seminal vesicles

Presence or absence of extramural venous invasion

Maximum depth of extramural spread in mm with T substage given

Presence or absence of malignant lymph nodes

Minimum distance to mesorectal fascia

In the final assessment, the TNM stage and an assessment of potential resection margin involvement/safety of the TME plane (classified as potentially involved if tumour <1 mm to the mesorectal fascia) should be made.

Use of a reporting proforma may aid in ensuring that the staging report is comprehensive and includes all important positive and negative findings.

3.4 CT

The protocol employed is the same as for CT staging of colon cancers and, as for colon cancer patients, CT of the thorax, abdomen and pelvis with intravenous contrast medium should be performed for all patients to detect distant spread of disease. CT is only recommended for local staging of the primary rectal cancer if MRI staging is contraindicated.

3.4.1 Assessment of distant metastatic disease in colorectal cancer

In recent years, the benefits of surgical resection and systemic chemotherapy in prolonging survival in patients with pulmonary and/or hepatic metastases have become established. Current strategies now aim to increase the number of patients who are suitable for curative resection. Improving outcomes is dependent on patient selection, which requires careful assessment of the precise location of metastases and exclusion of patients with irresectable metastatic disease.

Magnetic resonance is the technique of choice in staging patients with colorectal liver metastases, since it shows superior sensitivity in identifying lesions compared with CT and PET-CT. The technique requires the use of liver-specific contrast agents which results in the higher sensitivities in the detection of metastatic disease.

Careful review of CT thorax/abdomen and pelvis enables detection of other sites of metastatic disease which may not be amenable to curative resection; for example, retroperitoneal lymphadenopathy, disseminated pulmonary metastatic disease or peritoneal/omental spread.

FDG PET-CT has been shown to be a cost- effective tool in the evaluation of extrahepatic/extrapulmonary disease in patients being considered for pulmonary/hepatic resection (however, lesions <1 cm may not be detected, and mucinous metastases may not be shown), therefore CT and MRI scans should also be carefully reviewed.

3.4.2 Follow Up in colorectal cancer

CT of the chest, abdomen and pelvis should be undertaken at 1 year, 2 years and 5 years post resection as part of the patient's clinical follow up programme. The technique is as for the initial staging examination.

For patients diagnosed with local recurrence, MRI is the modality of choice to assess local extent within the pelvis prior to planning exenterative surgery with intent to cure or for determining radical non-surgical therapy.

Outside the liver and pelvis, FDG PET-CT detects occult distant metastases in patients, leading to changes in management. It is particularly efficient in detecting small volume disease in areas which may be difficult to visualise with CT, such as mesentery or peritoneum.

Follow-up is undertaken when there is the suspicion of recurrent disease, such as elevation of serum CEA levels, which should also be performed as a baseline prior to chemotherapy. Careful review of surveillance CT scans when compared with baseline imaging will identify a recurrence in the vast majority of cases. In patients with a rising CEA level in whom recurrent disease has not been detected by CT or pelvic/liver MRI, FDG PET-CT may be helpful in locating the recurrence.

3.4.3 Follow up post hepatic resection

For patients where hepatic resection of metastases has been undertaken, a more intense follow up is required. CT or MRI is undertaken every 6 months for the first 2 years after resection. Annual CT/MRI is then performed for the last 3 years of surveillance.

3.5 Anal Cancer

All patients with biopsy-proven anal cancer should be staged.

3.5.1 Staging Objectives

To assess tumour length.

To determine circumferential extent.

To assess involvement of adjacent structures.

To determine presence or absence of locoregional lymphadenopathy.

To assess for distant metastases.

3.5.2 Staging

MRI is the modality of choice to assess extent of local invasion to sphincter, pelvic floor and adjacent structures. CT is used for the detection of hepatic nodal and pulmonary metastases. PET-CT may characterise local, regional nodes and detect distant metastases, especially when CT/MRI is equivocal. Imaging is increasingly employed to define disease extent to aid treatment planning, for the follow-up of patients undergoing chemoradiation, and in the surveillance of patients to detect relapse.

Clear pretreatment delineation of pelvic disease by MRI enables optimal planning of radiotherapy to the target volume.

Distant metastases can be detected by using CT scanning.

Enlarged groin lymph nodes can be assessed by fine needle aspiration (or biopsy), if necessary under ultrasound guidance. A high proportion of enlarged groin nodes in patients with anal cancer will show reactive changes only.

3.5.3 MRI

Protocol for imaging of anal cancer

Sequence	Plane	Slice thickness	Field of view	Principle observations
T2W	Sagittal	5mm	Large	Localise tumour, length of tumour
T2W	Axial	5mm	Large	Pelvic/inguinal disease
T2W	Oblique axial/coronal	3mm	Small 16cm FOV 256 x 256 matrix, 0.6 x 0.6mm in plne resolution	Assess primary tumour dimensions and local spread Scans perpendicular and coronal to the anal canal

3.5.4 CT

CT of the chest, abdomen and pelvis (to include groin areas) with intravenous contrast medium should be performed to detect distant spread of disease. The technique is as for staging of colorectal cancer. The inguinal regions should be adequately covered.

PET CT should be considered in all patients where the radiological staging is beyond that of T1.

3.5.5 Follow Up in Anal Cancer

Clinical response should be assessed at six to eight weeks after completion of treatment.

Suspicion of major residual tumour or progression on MRI should be considered for biopsy.

MRI can complement clinical assessment, and act as a useful baseline: the high- resolution T2W technique also has the advantage of showing fibrosis as low signal intensity which enables assessment of post-treatment-related changes on subsequent follow-up imaging. Following chemoradiotherapy, MRI is able to demonstrate tumour regression and document sustained response. For patients with a good partial regression this may require assessment by MRI at three to six-monthly intervals. In patients that fail to show a response

or have recurrent disease, imaging enables delineation of disease for possible salvage surgery. Patients being considered for salvage surgery should be restaged with:

Pelvic MRI for the extent of local disease

CT chest/abdomen for distant metastases

PET scanning may be of value for detecting distant metastases or local spread after chemoradiotherapy and is indicated if radical salvage surgery is planned.

4.0 Gynaecological Cancers

4.1 Cervical cancers

4.1.1 Staging:

- Stage 1A
  No routine imaging.

- Stage 1B / 2
  MR Pelvis Dedicated cervical protocol including DWI. No Gd.
  CT Chest and Abdomen
  Consider PET CT

- Stage 3 / 4
  CT / MR as above

4.1.2 Surveillance:

-MRI at end of phase 1 treatment
-MRI at end of phase 2 brachytherapy
-Consider PET CT at 9 months

4.2 Endometrial cancers

4.2.1 Diagnosis:

TVUS

4.2.2 Staging:

All grades MR Pelvis
Dedicated endometrial protocol including DWI and dynamic post Gd series

Maidstone - MR Abdomen, CT Thorax grade 3, CXR grade 1

East Kent - CT CAP all grades

4.2.3 Surveillance

- No routine imaging
- CT CAP if clinical suspicion of relapse in high grade disease
- Consider PET CT / MRI if on-going concern

4.3 Ovarian cancers

4.3.1 Diagnosis

Pelvic TA / TV ultrasound

4.3.2 Characterisation of ovarian lesions

MRI Pelvis

4.3.3 Ultrasound or CT Biopsy

Where indicated for tissue diagnosis prior to neoadjuvant chemotherapy
To be discussed at MDM prior to request

4.3.4 Staging

CT CAP
IV contrast
Oral water with gastrograffin

4.3.5 Surveillance

- No routine imaging
- As necessary to review response to treatment and/or when relapse is suspected
- CT CAP in neoadjuvant after 3-4 cycles to assess response and plan continued treatment and after completion of treatment to confirm response

- Subsequent CT if 2 serial rises in Ca125 and in all patients to investigate new suspicious symptoms
- Consider PET CT or whole body DWI

4.4 Vaginal Cancers

4.4.1 Diagnosis

TVUS

4.4.2 Staging

CT CAP
MRI Pelvis Dedicated with gadolinium

4.4.3 Surveillance

Clinical Discretion

4.5 Vulval Cancers

4.5.1 Staging:

1. CT CAP
2. MR May be required to assess primary, pelvic and inguinal lymph nodes
3. U/S FNA May be indicated if suspicious groin nodes

4.5.2 Surveillance

No routine imaging
MRI Pelvis / Perineum +/- U/S FNA groins if clinical suspicion of recurrence

4.6 MRI Techniques

4.6.1 Generally

- T1 Coronal Abdomen and Pelvis : Body Coil, 5 mm, FOV whole pelvis
- T1 Axial Pelvis : Body/phased array coil, 5 mm, whole pelvis

- T2 Sagittal Pelvis : Phased array body/pelvic, 3-5 mm, small FOV

- T2 Axial Pelvis : Phased array body/pelvic, 3-5 mm, small FOV

- T2 Coronal Pelvis : Phased array body/pelvic, 3-5 mm, small FOV

- MRI sequences for the abdomen may be omitted if this region has been staged with CT

FOR SPECIFIC INDICATIONS INCLUDE:

4.6.2 Cervical Cancer

- T2 true axial through cervix- axial oblique angled at 90 degrees to the endocervical canal, phased array coil, 3 mm, small FOV

- True coronal T2W through cervix, 3mm , small FOV

4.6.3 Uterine Cancer

- T2 axial oblique with the same parameters. 2 blocks:

> One at 90 degrees to the endometrium

and the other

> Parallel to the endometrium

- T1 sagittal post Gd sequence as detailed in endometrial section.

4.6.4 Ovarian Cancer

- Fat Sat T1 axial plane pre and post Gd

4.6.5 Vaginal Cancer

- Fat Sat T1 3 planes post Gd

4.6.6 Pelvic Clearance – prior to surgery

- T2 pelvis in 3 orthogonal planes as well as post Gd fat sat 3 planes

- PET CT

4.7 PET-CT for Gynae Cancers

PET CT may be useful to define the presence and extent of metastases.

NOTE: *PET-CT for gynae cancer falls within the "discretionary circumstances" section of the PET-CT guidelines and the decision whether or not to perform PET-CT will be at the discretion of the ARSAC Licence Holder of the department to which requests are submitted.*

5.0 Head and Neck Cancer

5.1.1 Diagnosis

1) Ultrasound neck with FNAC or core biopsy

5.1.2 Staging

1) For all H&N cancer sites – CT skull base to abdomen

    - CT Chest and abdomen

2) For imaging of primary site and neck

    - MRI, CT or both according to tumour site

Primary Site	MRI Head & Neck
Oral cavity	
Tongue	Yes
Floor of mouth	Yes
Alveolus	Yes
Hard palate	Yes
Lip	Yes
Nasopharynx	Yes
Oropharynx	
Palate	Yes
Tongue base	Yes
Tonsil	Yes
Larynx & Hupopharynx	Yes
Cervical oesophagus	Yes
Salivary Gland	
Parotid	Yes

Submandibular	Yes
Sinonasal	Yes
Ear	Yes
Unknown primary site	Yes

5.1.3 Surveillance

No routine imaging.

5.1.4 Post-treatment imaging

Imaging performed following chemo-radiotherapy to establish complete response

1) PET-CT to be done at 10 weeks post-treatment,

2) Neck ultrasound

3) MRI

5.2 Imaging Techniques

5.2.1 MRI Head & Neck

Quiet respiration

- No swallowing

- Fine matrix

- Combined H&N coil

- Axial T1W, and Stir

- Coronal T1W and T2W

- +T1W Fat suppressed post contrast on all post treatment cases plus all cases invading the skull base – axial + coronal

- Axial parallel to hard palate

5.2.2 CT Head and Neck

- Should be performed with arms down

5.3 PET-CT for Head and Neck Cancers

1) Lymph node metastasis – unknown primary

2) Selected cases for elucidation of abnormalities seen on CT at distant sites

3) PET-CT for assessment of response after chemoradiotherapy

6.0 Lung Cancer

6.1

6.1.1 Diagnosis

1) CXR/CT Chest

2) CT lung biopsy, pleural aspiration/biopsy under US or CT guidance

3) Medical thoroscopy

6.1.2 Staging

1) Non Small Cell Lung Cancer

- CT Chest & abdomen & pelvis (PET where CT stage is inconclusive)

2) Small Cell Lung Cancer

- CT Chest & abdomen & pelvis (PET if inconclusive & US)

3) To assess radical intervention

- PET-CT (imaging of the brain should be considered)

6.1.3 Surveillance

1) Post op CT &/or chest x-ray

6.2 PET-CT for Lung Cancers

1) Patients being considered for radical treatment which means surgery and/or chemo rad with radical intent

2) Differentiation of benign Vs malignant lesions where anatomical imaging or biopsy is inconclusive or there is a relative contraindication to biopsy

7.0 Skin Cancer

7.1 Melanoma (all sites)

7.1.1 Staging

7.1.1.1 Stage I-IIA

≤ 4 mm without ulceration or ≤ 2 mm; with ulceration

- No imaging required

7.1.1.2 AJCC Stage IIB and above

- CT head/chest/abdomen/pelvis +/- neck depending on location of primary tumour
- MRI head in selected cases for further investigation of abnormalities seen on CT, to confirm presence of cerebral metastasis prior to seeking a neurosurgical opinion regarding resection
- PET/CT in selected cases

7.1.1.3 AJCC Stage III

Involved nodes

- Staging to include metastatic disease prior to consideration of radical lymphadenectomy
- CT head/chest/abdomen/pelvis
- PET/CT scan in selected cases for further investigation of abnormalities seen on CT
- Following radical surgery patients require surveillance imaging as per section 7.1.3

7.1.1.4 AJCC Stage IV

Distant Metastases

- CT head/neck/chest/abdomen/pelvis
- MRI head in select cases for further investigation of abnormalities seen on CT, to confirm presence of cerebral metastasis prior to seeking a neurosurgical opinion regarding resection
- PET/CT scan in selected cases

7.1.2 Melanoma - Head & Neck - Staging

- MRI neck
- CT head/neck/chest/abdomen/pelvis
- PET/CT scan in selected cases for further investigation of abnormalities see on CT

7.1.3 Follow Up

High risk patients AJCC stage IIB and above

Imaging

- CT head/chest/abdomen/pelvis +/- neck depending on location of primary tumour
- MRI head in selected cases for further investigation of abnormalities seen on CT, to confirm presence of solitary cerebral metastasis prior to seeking a neurosurgical opinion regarding resection

Frequency

- Baseline – Years 1-3 6 monthly and years 4-5 annually

7.2 Sentinel Node Biopsy

Sentinel node biopsy – ONLY IN THE CONTEXT OF A CLINICAL TRIAL

7.3 Squamous Carcinoma

7.3.1 Staging

No routine staging.

CT or MRI may be considered for advanced cases prior to surgery or radiotherapy.

7.3.2 Nodal Recurrence

CT chest, abdomen and pelvis (include neck also for H&N cases)

7.4 Basal Cell Cancer

7.4.1 Staging

No routine staging

CT or MRI may be considered for very advanced cases prior to surgery or radiotherapy

7.7 PET-CT for Skin Cancers

1) Detection of metastasis in patients with melanoma.

- where number of metastases are few and resection may be an option
- with proven inguinal node involvement and suspicious or equivocal CT findings in iliac or paraortic nodes
- investigation of melanoma metastases from an unknown primary site

8.0 Thyroid Cancer

8.1.1 Diagnosis

8.1.1.1 Solitary Thyroid Lump

- Ultrasound neck by Trained US practitioner to classify nodultes U1-5

- FNAC for lesions U1,3, 4 or 5

- Thyroid Isotope Scan (Tc99m or123I) - On selected patients

- MIBI or Thallium - On selected patients with non functioning nodules and indeterminate FNAC

- CT Neck and chest - Retrosternal goitre or upper airway compression / vocal cord palsy

- Core biopsy may help in diagnosis of lymphoma, papillary cancer or anaplastic

8.1.1.2 Multinodular or other large goitre

- Ultrasound with FNAC or core biopsy

- Thyroid Isotope Scan (Tc99m or123I) - May identify dominant or non-functioning tissue

- MIBI or Thallium - On selected patients with non functioning nodules and indeterminate FNAC

- CT Neck and Chest - Retrosternal goitre or upper airway compression / Vocal cord palsy

8.1.2 Staging

1) CT neck, chest and abdomen in high risk patients

    - Without contrast if before radioiodine (unless specifically requested)

    - Ideally performed with contrast after radio iodine therapy

    - High risk features include extracapsular spread, nodal involvement, distant metastases or age >60

2) Post Therapy Radio-iodine scan

    - All patients following radio-iodine

3) Gadolinium enhanced MRI

    - To assess extent of neck disease prior to surgery or radiotherapy

    - Selected patients

4) Isotope bone Scan

    - Patients with symptoms suggestive of bone metastases

5) Octreotide, Pentavalent DMSA or MIBG isotope studies

    - Selected patients with medullary carcinoma

8.1.3 Surveillance

1) Post iodine assessment (6-12 months)

    - Either iodine uptake scan (following thyroid hormone withdrawal or rh-TSH administration)

    - Or neck ultrasound (followed by rh-TSH stimulated thyroglobulin estimation)

2) No suspicion of recurrence

    - No imaging

3) Suspicion of recurrence

    - Rising Tg or calcitonin or neck lump

        - Ultrasound neck

        - CT Neck and Chest and Abdomen

        - Iodine isotope scan (123 I or 131 I)

        - MRI Neck - Selected patients

- FDG PET/CT - Selected patients including those with raised thyroglobulin and negative iodine uptake
- Octreotide, Pentavalent DMSA or MIBG isotope studies – Selected patients with medullary carcinoma

8.2 PET-CT for Thyroid Cancers

1) Assessment of patients with elevated thyroglobulin and negative iodine scans for recurrent disease.

9.0 Upper GI Cancers

9.1 Oesophageal & Gastric Cancers

9.1.1 Diagnosis

Patients with a HIGH index of suspicion of cancer should be referred to the rapid access upper GI cancer clinic

1) Gastroscopy

2) Patients where endoscopy is negative BUT the index of suspicion of cancer remains HIGH

- CT scan of the Chest, abdomen and pelvis with oral and IV contrast if no contraindications.

3) Ba swallow/meal should only be used as a first line investigation in dysphagia in elderly patients with a long history of dysphagia in whom a pouch is suspected or in those who decline endoscopy.

9.1.2 Staging

1) For patients with gastric /oesophageal cancers.

- CT Chest and abdomen (and pelvis for gastric patients) with 1L of oral water and IV contrast if no contraindications.

2) For patients with oesophageal cancer who may be suitable for curative treatment:

- EUS
- PET-CT

9.1.3 Surveillance

Follow up imaging – CT Chest and abdomen (plus pelvis for gastric patients) with 1L of oral water and IV contrast if no contraindications.

9.2 PET-CT for O-G Cancers

Assessment for operability/radical treatment for cancers of the oesophagus and oesophago-gastric junction.

(The PET-CT Reference Group is looking into the possibility of submitting patients into a clinical trial on this topic.)

Currently no agreement for routinely requesting PET/CT for cancers below the oesophago-gastric junction.

9.3 Hepatocellular Cancers

9.3.1 Diagnosis and Staging

1) Ultrasound – Should be used for surveillance of patients at high risk. Contrast US is currently not recommended for routine surveillance of patients at risk. Contrast US may be used for lesion characterisation where CT and MRI have not been helpful or in patients who cannot have IV contrast medium.

2) CT Chest, Abdomen & Pelvis – for staging and diagnosis – with 1L of oral water and IV contrast medium. To include dual phase acquisition through the liver in arterial and portal vein phases.

Consider non-enhanced and delayed venous phase for diagnosis and lesion characterisation.

3) MRI with IV gadolinium for lesion characterisation and local staging – Consider liver specific contrast medium.

9.3.2 Follow Up

Follow up imaging - CT Chest, abdomen and pelvis with 1L of oral water and IV contrast medium.

9.3.3 Surveillance

No routine imaging.

9.4 Bile Duct Cancers

9.4.1/2 Diagnosis & Staging

1) Ultrasound – to detect bile duct obstruction or liver mass in patients with obstructive jaundice.

2) CT Chest, Abdomen & Pelvis with 1L of oral water and IV contrast medium.

3) MRCP and liver MRI – MRCP can be helpful in both the diagnosis and planning of treatment in patients with bile duct cancer.

4) EUS – for problem solving, detection of occult tumours not seen on other imaging modalities and for biopsy.

5) ERCP should not be used routinely to diagnose bile duct cancers. The role of ERCP in these patients is to stent the biliary tree and to obtain cytology at the time of stenting.

9.4.3 Follow Up

Follow up imaging – CT Chest, abdomen and pelvis with 1L of oral water and IV contrast medium.

9.5 Pancreatic Cancer

9.5.1/2 Diagnosis & Staging

1) Ultrasound – Is useful as first line investigation in patients with obstructive jaundice.

2) CT Chest, abdomen and pelvis with 1L of oral water and IV contrast medium. Should include a dual phase acquisition through the pancreas in arterial and portal venous phases.

3) MRI – Can also be used for lesion characterisation, detection of pancreatic tumours and local staging.

4) EUS- For problem solving, detection of tumours not seen on other imaging modalities and for biopsy.

9.5.3 Follow up

Follow up imaging – CT Chest, abdomen and pelvis with 1L of oral water and IV contrast medium

10.0 Urological Cancers

10.1 Haematuria

10.1.1 Diagnosis

Notes:

Haematuria

- *Macroscopic*
- *Microscopic – symptomatic (loin pain, frequency)*
- *without infection, age > 50 Yrs*

1) Renal US & plain film
2) Flexible cystoscopy
3) CT Urogram – if other investigations are “normal”
4) CT abdomen & pelvis - For undiagnosed macroscopic haematuria

10.2 Bladder Cancers

10.2.1 Staging

Comment from DVH: MR Pelvis/Bladder Carcinoma: local staging after CT ? muscle invasive Bladder CA
- Filled bladder or clamped catheter
- Ax T2 whole Pelvis: 6mm slice thickness
- Ax T1 whole Pelvis: 6mm slice thickness
- Ax + Sag + Cor T2 small FOV, small pelvis/tumor: 3-5mm slice thickness
- Ax DWI: b 0,500,1000, 5mm: staging muscle invasion

b. MR Pelvis/Prostate Carcinoma: local staging - Technique (see ESUR 2012)
- Sagittal T2, 3mm slice thickness, small FOV
- Axial (to prostate) T2, 3mm slice thickness
- Coronal (to prostate) T2, 3mm slice thickness
- Axial (whole pelvis) T2, 5-6mm slice thickness, large FOV
- T1 5-6mm slice thickness
- Axial DWI&ADC: TE MIN (<90ms), 4mm slice thickness, IPR 1x1-2x2mm, b 0-100-(500)-1000s/mm2 in 3D, ADC b1000
- Currently NOT done @ DVH: DCE MRI

Axial DCE-MRI: 3D FS T1W GE THRIVE -/+ iv GD @3ml/s, 4mm slice thickness, IPR 1x1mm, temp res <10-15s: @ q10-15s for 5min

1) CT chest, abdomen & pelvis - For patients deemed fit for surgical or other radical Rx
2) MRI - May be required for certain cases to improve assessment of local extent
3) Bone scan - If clinically indicated

10.2.2 Surveillance

No routine imaging.

CT Chest, Abdomen & Pelvis for Invasive cancers

10.3 Kidney Cancers

10.3.1 Staging

1) CT chest, abdomen and pelvis

2) MR - If IVC invasion seen on CT – to clarify upper level

10.3.2 Surveillance

Table 10.3.2.1 Surveillance Programme

Tumour	6/12	1yr	18/12	2yr	3yr	4yr	5yr	6yr	7yr	8yr	9yr	10yr	After
Low risk		CT C+A											
Intermediate		CT C+A		USS / CXR	CT C+A	USS / CXR	CT C+A	USS / CXR	USS / CXR	USS / CXR	USS / CXR	USS / CXR	
High	CT C+A	CT C+A	CT C+A	CT C+A	CT C+A	CT C+A	CT C+A	USS / CXR	CT C+A	USS / CXR	USS / CXR	CT C+A	Annual USS / CXR
Partial: Low Risk		CT C+A		USS / CXR	USS / CXR	USS / CXR	USS / CXR						
Partial: Intermediate Risk	CT C+A	CT C+A	CT C+A	CT C+A	CT C+A	CT C+A	CT C+A	USS / CXR	USS / CXR	USS / CXR	USS / CXR	USS / CXR	Biannual USS / CXR

CT C+A = CT Chest and Abdomen
USS / CXR = Ultrasound abdomen plus chest X-Ray
Patients post ablative therapy require early phase CT kidney at 3/12 – then surveillance as high risk

10.4 Teratoma & Seminoma

10.4.1 Diagnosis

Ultrasound.

10.4.2 Staging

CT Chest, abdomen & pelvis.

10.4.3 Surveillance

1) TERATOMA - ONLY for patients who have a NEGATIVE pelvic staging CT

    - CT Chest & abdomen - Performed at 3,6,9,12 & 24 months

2) SEMINOMA - For patients who have received adjuvant treatment

    - CXR - Performed 3 monthly for the 1st year & then 6 monthly to 5 years

3) SEMINOMA - For patients who have not received adjuvant treatment

    - CT Chest & abdomen - Performed at 3,6,9,12 & 24 months

10.5 PET-CT for Testicular Cancers

1) Assessment of recurrent disease from seminomas or teratomas

2) Assessment of residual masses

NOTE: *PET-CT for Testicular cancer falls within the "discretionary circumstances" section of the PET-CT guidelines and the decision whether or not to perform PET-CT will be at the discretion of the ARSAC Licence Holder of the department to which requests are submitted*

10.6 Prostate Cancer

10.6.1 Diagnosis

1) TRUS - Unless clinical diagnosis is obvious and sufficient for management plan (unfit patients)

    - 8-12 biopsies in 4 pots – minimum standard

    - 8-12 biopsies in 8-12 pots – gold standard

10.6.2 Staging

1) Radical treatment being considered (and/or any of the following):

    a) Gleeson ≥ 4+3

    b) PSA 15 or above

    c) Bilateral disease or if ≥ 50% of biopsies taken are positive

    - MRI

    - Bone scan

10.6.3 Surveillance

Bone Scan – not routinely indicated, may be of value in patients experiencing bone pain

10.7 Techniques

1) MR Pelvis

- Axial T1 or T2 5 mm whole pelvis
- Axial T2 3 mm prostate
- Coronal T2 3 mm prostate
- Sagittal T2 4 mm whole pelvis

11.0 Misc. PET-CT Guidelines (not covered in main disease sit sections)

PET-CT may be requested in the following circumstances:

11.1 Lymphoma

Base line scan and subsequent scan to evaluate residual disease.

11.2 CNS cancers

1) Grading of Glioma
2) Assessment of recurrent residual disease in the setting of radiotherapy or surgical change

This section covers those circumstances when the decision whether or not to perform PET-CT will be at the discretion of the ARSAC Licence Holder of the department to which requests are submitted.

11.3 Musculoskeletal cancers

Grading and staging of malignancy.

12.0 Glossary

Acronyms in common usage throughout K&M Cancer documentation

CNB	Cancer Network Board
CYP	Children & Young People (in relation to the IOG)
DCCAG	Diagnostic Cross Cutting Advisory Group
DOG	Disease Orientated Group (NSSG/TSSG/TWG)
DVH	Darent Valley Hospital
EK	East Kent
EKHUFT	East Kent Hospitals University Foundation Trust
HoP	High Level Operational Policy
IOSC	Improving Outcomes: A Strategy for Cancer
K&C	Kent & Canterbury Hospital, Canterbury, (EKHUFT)
KMCC	Kent & Medway Cancer Cancer Collaborative
KMCRN	Kent & Medway Cancer Research Network
LSESN	London & South East Sarcoma Network
MFT	Medway Foundation Trust
MTW	Maidstone & Tunbridge Wells NHS Trust
NOG	Non Surgical Oncology Group *(Permanent oncologist sub group of the TSSGs with a specific responsibility for chemo/rad pathways and advice to the TSSG, Network and GEOGRAPHICAL LOCATIONs on new drugs)*
PoC	Pathway of Care *(Network agreed disease site specific clinical guidelines)*
QEQM	Queen Elizabeth the Queen Mother Hospital, Margate (EKHUFT)
QoL	Quality of life
RAT	Research and Trial Group *(Permanent sub-group of the TSSGs with a specific responsibility for taking forward the clinical trials agenda)*
RMH	Royal Marsden Hospital
RNOH	Royal National Orthopaedic Hospital
QVH	Queen Victoria Foundation Trust Hospital East Grinstead
UCLH	University College Hospital London
WHH	William Harvey Hospital, Ashford (EKHUFT)
WK	West Kent

13.0 Document Administration

Document Title	Imaging For Cancer
Principle author	Radiology CCAG/Diagnostics CCAG
Co-author(s)	I.Morrison/N.Rowell
Current version number	8.5
Current status	Draft / WIP
Agreed as “Fit for Publication” by	March 2014
Original publication date	April 2006
Expected review date by	March 2016

Enquiries:		
[1] Iain Morrison	01227 766877 ext 74343	iain.morrison@ekht.nhs.uk
[2] Paul Ryan	01634 833889	paul.ryan@medway.nhs.uk

Revision History			
Date of revision	New Version Number	Nature of Revision	Confirmation of Accuracy by
July 2005	1.0	Published	Radiology CCAG
January 2006	1.1	Review – Updates from disease site pathway revisions	Radiology CCAG
March 2006	2.0	Published – Updates from disease site pathway revisions	Radiology CCAG
April 2007	3.0	Published – Updates to include Thyroid	Radiology CCAG
June 2008	4.1	Revision draft – General review – changes to gynaecology only	Radiology CCAG
March 2009	5.0	Published – Changes to urology to be consistent with Urology Pathways of Care	I.Morrison/A.Jackson
March 2009	6.0	Published – Updates to Urology following 12th March workshop / Updates to Gynaecology following 9th March workshop	I.Morrison/ K.Entwisle/ A.Jackson
June 2010	7.0	Published – Updates to Breast cancer staging investigations	I.Vousden/ I.Morrison
January 2012	7.1, 7.2, 7.3, 7.4	Put in to new format and N.Rowell changes made to Head & Neck and Thyroid	N.Rowell
May 2012	7.5	Amendments to Bladder and Prostate after relevant sub-group meetings	Bladder & Prostate Sub Groups
June 2012	7.6	Draft – updated with general new formatting & content checking	C.Tsatsaklas
June 2012	8.0	Final	I.Vousden/Diagnostics CCAG
Feb 2014	8.1	Draft – updated general admin text i.e. remove DOG, replace with TSSG	C.Tsatsaklas
Feb 2014	8.2	Draft – N.Rowell (Head & Neck	N.Rowell

		TSSG Chair) approved final updates to head & neck and thyroid section	
March 2014	8.3	Draft – Update to Lung section as recorded and agreed in the Lung TSSG 3/3/14	C.Tsatsaklas/Lung TSSG
July 2014	8.4	Draft – Update to Breast, Gynae, Upper GI and Skin sections from changed emailed	N.Aluwalia/ R.Toye/K.Entwistle/P.Matravers/ N.Rowell
August 2014	8.5	Draft – Update to Thyroid Section	N.Aluwalia/M.Harron
December 2014	8.6	Draft – Colorectal section now updated	N.Aluwalia/S.Houghton/M.Hill/D.Lawes
January 2015	9.0	Final – Published	N.Aluwalia